

**Remarks:**

Claims 16-32 are pending.

Claims 1-15 are cancelled, without prejudice or disclaimer.

Claims 16-23 and 26-32 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 6,558,792 (Vaabengaard) further in view of EP479311 (Minoru). Claims 24 and 25 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Vaabengaard further in view of Minoru, as above, further in view of US 4231369 (Sorenson). Claims 33 and 34 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Vaabengaard further in view of Minoru, as above, further in view of U.S. Patent No. 5,109,874 (Bellingham). Reconsideration of the aforesaid rejections under §103(a) (collectively "the rejections") is requested.

The rejections indispensably rely on combining the teachings of Vaabengaard and Minoru in the same manner, in order to show *prima facie* obviousness, the initial and continuing burdens of which rest with the PTO. *In re Oetiker*, 24 USPQ 1443, 1444 and 1447 (Fed. Cir. 1992). Since the combination of teachings common to the rejections constitutes clear error (as explained below), none of the rejections can be maintained. *See In re Fine*, 5 USPQ2d 1596 (Fed. Cir. 1988).

In the context of a rejection for obviousness under §103, the "Examiner bears [both] the initial burden ...of presenting a *prima facie* case of unpatentability" and "the ultimate burden of persuasion on the issue." *Oetiker*, 24 USPQ2d at 1444 and 1447.

The Examiner can satisfy this burden only by showing some objective *teaching* in the prior art or that *knowledge* generally available to one of ordinary skill in the art *would lead* that individual to combine the relevant references.

*Ex parte Obukowicz*, 27 USPQ2d 1063, 1065 (BPA&I 1992) (*emphasis added*). "The mere fact that the prior art may be modified in the manner suggested by the Examiner," *In re Fritch*, 23 USPQ2d 1780, 1783-84 (Fed. Cir. 1992), or that all elements of a claimed invention are known, *Ex parte Clapp*, 227 USPQ 972 (BPA&I 1985), does not make the combination obvious, "even when the level of skill is high," *In re Rouffet*, 47 USPQ2d 1453, 1459 (Fed. Cir. 1998), "unless the art also contains something to suggest the desirability of the proposed combination." *In re Bergel*, 130 USPQ 206, 208 (CCPA 1961) (*emphasis added*). "Indeed, the teachings of the references can be combined only if there is some suggestion or incentive to do so." *Obukowicz*, 27 USPQ2d at 1065.

The totality of each reference's teachings must be considered when combining those teachings with the rest of the prior art. *W. L. Gore & Assoc., Inc. v. Garlock, Inc.*, 220 USPQ 303, 311 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984). "One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention." *In re Fine*, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988).

It is impermissible within the framework of §103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art.

*In re Hedges*, 228 USPQ 685, 687 (Fed. Cir. 1986).

"There is no suggestion to combine...if a reference teaches away from its combination with another source." *Tec Air, Inc., v. Denso Manufacturing Michigan Inc.*, 52 USPQ2d 1294, 1298 (Fed. Cir. 1999). If the cited references "teach away from [each other]...then that finding alone can defeat

[the]...obviousness claim." *Winner Int'l. Royalty Corp. v. Wang*, 53 USPQ2d 1580, 1587 (Fed. Cir. 2000), *cert. denied*, 530 U.S. 1238 (2000).

The properties exhibited by a claimed invention must be taken into consideration when comparing the claims against the prior art, whether or not the properties are recited in the claims. *In re Estes*, 164 USPQ 519 (CCPA). *See, In re Papesch*, 137 USPQ 43, 51 (CCPA 1963). *Prima facie* obviousness "will be rebutted if...there are new and unexpected results relative to the prior art" [citation omitted]. *Iron Grip Barbell Co. v. USA Sports Inc.*, 73 USPQ2d 1225, 1228 (Fed. Cir. 2004).

The presently claimed "adhesive" comprises (a) a block-copolymer component and (b) a homopolymer component. The block copolymer can be polyisobutylene-styrene (PIBS), and the homopolymer can be polyisobutylene (PIB). Vaabengaard (column 4, lines 28-31) teaches an adhesive that meets only the latter (PIB) homopolymer component, i.e., as the "conjugated butadiene" "rubbery component" of the reference adhesive. Nevertheless, the rejections allege that it would have been obvious to use PIBS in Vaabengaard and, so, meet the block-copolymer component, as well.

More precisely, although the rejections (Office Action, pages 5-6) admit Vaabengaard "is silent" as to the block-copolymer component of the rejected claims, the reference adhesive can contain an "elastomer," e.g., the block copolymers styrene-isoprene-styrene (SIS) and styrene-butadiene-styrene (SBS), as a "cohesive strengthening agent" component.

According to the rejection (Office Action, page 5) Minoru discloses the PIBS (block copolymer embodiment) component of the presently claimed adhesive and allegedly teaches that PIBS "block copolymers have better tackiness and adhesion than . . . styrene-isoprene block copolymer [SIS] and styrene-butadiene block copolymer [SBS]." Allegedly, therefore it would have been obvious in view of Minoru to modify Vaabengaard, i.e., to use PIBS instead of SIS or SBS as the Vaabengaard cohesive strengthening agent, "in order to improve tackiness and adhesion of the adhesive composition in Vaabengaard" (Office Action, paragraph bridging pages 5 and 6).

As indicated above, and in order to provide the requisite prior art "desirability" (motivation) for the "modification" of Vaabengaard (*Fritch*, 23 USPQ at 1783-84), by "combination" with Minoru (*Bergel*, 130 USPQ at 208), the PTO relies on specific teachings found (allegedly) in Minoru, i.e., teachings found in the reference at "Page 2, second paragraph; Page 6, line 4 and Table" (Office Action, page 5). With all due respect, the reliance is misplaced, because it fails to consider the teachings of the cited references as a whole, *W. L. Gore & Assoc., Inc.*, 220 USPQ at 311; or, more precisely, it overlooks teachings "necessary for the full appreciation of what [each] such reference fairly suggests to one of ordinary skill in the art." *Hedges*, 228 USPQ at 687.

According to page 2, second paragraph, of Minoru, relied on in the rejections, the reference teaches (emphasis added):

Heretofore, tacky tapes, tacky sheets, etc., obtained by coating tackifier compositions comprising conjugated diene rubbers such as . . . a styrene-isoprene block copolymer [SIS], a styrene-butadiene block copolymer [SBS], etc. . . . have been industrially used in large quantities.

What the rejection overlooks, however, is the next paragraph in the reference, which teaches  
(emphasis added):

Since unvulcanized conjugated diene rubbers are substantially unstable to heat or ultraviolet rays, tackifiers based on the [unvulcanized] conjugated diene rubbers are poor in stability and weatherability and are thus much limited in their use field.

On the other hand, Vaabengaard (column 4, lines 32-40) teaches, as the "cohesive strengthening agent" of its adhesive, vulcanized diene rubbers, i.e., (emphasis added):

A cohesive-strengthening agent may be a physically cross-linked [i.e., vulcanized] . . . styrene-butadiene-styrene [SBS] copolymer, [or] styrene-isoprene [SIS] copolymer.

Accordingly; whereas, Minoru teaches only that "unvulcanized" SBS and SIS copolymers have poorer tackiness and adhesion than PIBS; and, whereas, Vaabengaard teaches use of only vulcanized SBS and SIS copolymers; therefore, the teachings at issue in Minoru have no relevance to the teachings at issue in Vaabengaard; and, therefore, the PTO fails to provide the "desirability" for "modification" of Vaabengaard, by" with Minoru, indispensable to sustaining the rejections. *Fritch*, 23 USPQ2d at 1783-84. *Bergel*, 130 USPQ at 208.

Moreover, nothing in the cited references teaches or suggests that PIBS exhibits the same "cohesive strength" properties exhibited by the vulcanized SBS and SIS taught by Vaabengaard. And, therefore, the rejection falls for failing to establish the requisite "foreseeability or predictability" that the replacement (PIBS) material will function the same as (i.e., satisfy the purpose of) the replaced (vulcanized SBS and SIS) material. Obviousness to combine requires "a reasonable expectation of success." *In re Vaeck*, 20 USPQ2d 1438, 1441 (Fed. Cir. 1991). *Procter & Gamble*

*Co. v. Teva Pharmaceuticals USA, Inc.*, 90 USPQ2d 1947, 1951 (Fed. Cir. 2009). *See KSR International Co. v. Teleflex, Inc.*, 550 U.S. 398, 127 SCt 1727, 82 USPQ2d 1385 (2007).

In fact, the skilled artisan would reasonably expect a lack of success, in that Vaabengaard effectively teaches away from its combination with Minoru as alleged in the rejections. The cross-linked "cohesive strengthening agent" taught by Vaabengaard (column 4, lines 32-46) is an "elastomer," of which SBS and SIS are disclosed examples. As the characterization "cohesive strengthening agent" implies, and as would be expected by the person skilled in the art, the cross-linking (vulcanization) of an elastomer has profound effects; e.g., as described in Billmeyer, *Textbook of Polymer Science 3<sup>rd</sup> Ed.* (1984), page 507 (copy provided herewith), "it transforms an elastomer . . . into a strong, elastic, tough rubber." An elastomer characteristic, essential for cross-linking, is of course unsaturation, i.e., double-bond containing repeat (monomeric) units. As described in Billmeyer page 140 (copy provided herewith): "The random cross-linking of double bonds [effects] . . . the formation of three-dimensional networks from polyfunctional monomers." As opposed to the unsaturated (diene) elastomer of Vaabengaard, which is cross-linked to form the "cohesive strengthening agent," PIBS (used by Minoru) is a saturated copolymer, which is unsuitable for crosslinking (as explained above) and, so, for the elastomer of Vaabengaard, which must be cross-linked.

Accordingly, by requiring the "cohesive strengthening agent" to be an unsaturated elastomer that is "cross-linked," Vaabengaard effectively teaches away from replacing one of the unsaturated elastomer embodiments SBS and SIS with the saturated PIBS as taught by Minoru. Since

Vaabengaard "teaches away from its combination with [Minoru], there is no suggestion to combine," *TecAir, Inc.*, 52 USPQ2d at 1298, which rebuts any "obviousness claim." *Wang*, 52 USPQ2d at 1587. Selected teachings of references can not be relied on "to the exclusion of other parts necessary to the full appreciation of what [each] such reference fairly suggests to one of ordinary skill in the art." *Hedges*, 228 USPQ at 687.

Moreover, still (as previously explained of record), the PTO totally ignores, incorrectly, the unexpected results (advantages) of preparing the adhesive composition comprising both PIB and PIBS as described and claimed in the subject application, supporting data of which are shown in the instant application, itself. *In re Margolis*, 228 USPQ 940 (Fed. Cir. 1986) (a showing in the specification of unexpected results must be taken into account by the examiner in a §103(a) analysis). The test data (and data-based conclusions) reported in the instant application (text and Tables 3 and 4 at page 18, last paragraph, through page 20, first paragraph) evidence the unexpected advantages (detailed below), and any alleged *prima facie* obviousness of combining PIB with PIBS or SIS based on the cited references is effectively rebutted, *Iron Grip Barbell Co.*, 73 USPQ2d at 1228, keeping in mind the advantages need not be recited in the claims. *Estes, supra*.

Specifically, the instant application (page 4, lines 8-18) describes the disadvantages of prior art adhesives that use PIB together with (either) SBS or SIS, such as instability due to the fact that PIB, a saturated homopolymer, is inadequately compatible with the unsaturated(diene)-block-containing SBS and SIS copolymers; and, further, how the (diene) unsaturation of SIS and SBS causes adhesives to yellow and deteriorate. Accordingly, as taught in the instant application (page

6, lines 11-12), the use of PIBS in an adhesive, as presently claimed, overcomes these disadvantages, i.e., adhesive instability is overcome because the saturated isobutylene ("IB") block provides for good compatibility with the saturated PIB (polyisobutylene) polymer, and, without the yellowing and deterioration typical of SBS. The subject application (page 6, lines 1-15) also teaches that PIBS has superior softness and barrier properties, due to the soft "IB" block, unmatched by either SIS or SBS. Thus, according to the presently claimed invention, there is good comparability between the soft segment of the block copolymer and the homopolymer

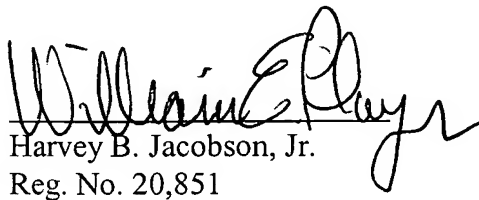
In view of the foregoing remarks, the rejections are overcome. Withdrawal of the rejections is in order.

Favorable action is requested.

Respectfully submitted,

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# TEXTBOOK OF POLYMER SCIENCE

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THIRD EDITION

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TABLE 19-1. Approximate United States Consumption of Rubber in 1982\*

Type	Consumption (million lb)
Natural rubber	1600
Synthetics	
SBR	2200
Polybutadiene	800
EPDM	300
Butyl	290
Neoprene	270
Nitrile	170
Polyisoprene	120
Other	50
Total synthetics	4200
Total	5800

\*Estimates from previous chapters and *Rubber World* 187 (6), 8 (1983).

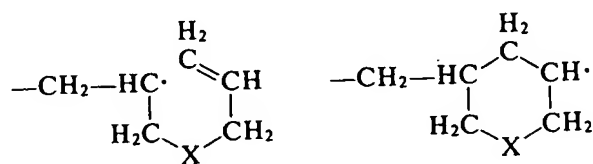
Improvements in processing and properties were made in two ways: Copolymers of butadiene with vinyl monomers, notably styrene, were introduced, and emulsion polymerization was adopted. The significance of initiators, reduction activators, and oxygen became known. The importance of maintaining low conversion or utilizing modifiers such as  $\text{CCl}_4$  and long-chain mercaptans was discovered. By the beginning of World War II, acceptable polymers (buna-S) were being produced in Germany containing 68–70% butadiene and 30–32% styrene.

In review of earlier chapters, it may be recalled that the unique properties of elastomers include their ability to stretch and retract rapidly, exhibit high strength and modulus while stretched, and recover fully on release of the stress. To obtain these properties, certain requirements are placed upon the molecular structure of the compounds: They must be high polymers, be above their glass transition temperatures, be amorphous in the unstretched state (but preferably develop crystallinity on stretching), and contain a network of crosslinks to restrain gross mobility of the chains.

## A. VULCANIZATION

The process by which a network of crosslinks is introduced into an elastomer is called *vulcanization*. The chemistry of vulcanization is complex and has not been well understood throughout the century of practice of the process since its discovery by Goodyear in 1839. The profound effects of vulcanization, however, are clear: it transforms an elastomer from a weak thermoplastic mass without useful mechanical properties into a strong, elastic, tough rubber (Table 19-2). The tensile strength, stiffness, and hysteresis (representing loss of energy as heat) of natural rubber before and after vulcanization are shown in Fig. 19-1, and the effects of

intermolecular *cyclopolymerization* mechanism (Butler 1966, Gibbs 1967). Successive propagation steps involve, alternately, the addition of a monomer and the formation of a six-membered ring:



where X is one of a variety of groups. Five- and seven-membered rings form from the appropriate polymers with more difficulty, and some open-chain unsaturated groups occur in the polymer.

**Crosslinking After Polymerization: Vulcanization.** This section is concerned only with the statistics of vulcanization and the distribution of molecular weights and crosslinks in the resulting polymer. Chemical aspects of vulcanization are discussed in Chapter 19.

The random crosslinking of double bonds bears formal resemblance to the formation of three-dimensional networks from polyfunctional monomers by stepwise polymerization. In keeping with previous nomenclature, the fraction of the monomer units on a chain that can be crosslinked is defined as  $q$  and the degree of polymerization of the chain as  $x$ . The "functionality" of the chain is its total number of vulcanizable groups  $qx$ . The extent of reaction  $p$  is the fraction of the total available crosslinks that have been formed.

Gelation occurs at a critical value of  $p$ ,  $p_c$ , where there is on the average one crosslink for every two chains:

$$p_c q x = 1 \quad (6-8)$$

As in the case of three-dimensional step-reaction polymers, after gelation the finite species constitute only part of the material, the rest being in the form of gel networks. As  $p$  increases from  $p_c$  to 1, the weight fraction of the finite species drops from unity to zero.

The case above does not correspond to actual vulcanization because it neglects the molecular-weight distribution of the chains initially present. If this is considered, the detailed analysis becomes complicated, but some important features remain about the same as for the monodisperse case. The gel point is given by the equation

$$p_c q \bar{x}_w = 1 \quad (6-9)$$

where  $\bar{x}_w$  is the weight-average degree of polymerization of the starting polymer.

Differences in chemical composition introduced by copolymerization or mixing may have more effect on the type of network structure than does molecular weight distribution. If, for example, a small amount of high-functionality polymer is mixed